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EXAMINER	
MERED, HABTE	

ART UNIT	PAPER NUMBER
2616	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/002,476	BLASAIK ET AL	
	Examiner	Art Unit	
	Habte Mered	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *4/4/2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-14,16-28,30-42 and 44-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-14,16-28,30-42 and 44-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 October 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The amendment filed on 4/4/2006 has been entered and fully considered.

2. Claims 1, 15, 29, and 43 are cancelled.

3. Claims 2-14, 16-28, 30-42, and 44-54 are pending.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. **Claims 5, 19, 33, and 47** are rejected under 35 U.S.C. 102(b) as being anticipated by Gopal et al (Multicasting to Multiple Groups Over Broadcast Channels, IEEE, July 1994, Pages 2423-2431), hereinafter referred to as Gopal.

Gopal discloses various methods in which the source multicasts to a number of different (and not necessarily disjoint) destination groups.

Gopal discloses a method for reliably transmitting a frame comprising the steps of: inserting two or more sequence numbers in the frame, wherein each of the two or more sequence numbers is associated with a destination node; and transmitting the frame to two or more destination nodes. **(See Page 2423, 2nd Column, last two lines and Page 2424, 1st Column, Lines 1-4)**

Gopal also discloses receiving an acknowledgment from a particular destination node of the two or more destination nodes. **(Gopal's system and all embodiments described focus on a data link protocol that ensures reliable sequential delivery of messages to all destinations as indicated in the last line of the first paragraph of the Introduction Section. He goes on to indicate in the second paragraph to**

indicate that such protocol is an ARQ protocol like selective repeat or Go-back-N and Acknowledgments from the destination are registered at the source. Gopal's system involves a single source broadcasting to multiple destinations. It is inherent to systems like Gopal that use ARQ protocol to receive some form of Acknowledgement from a subset of destinations involved in the system. See also Page 2425, Column 1, Lines 27-35)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. **Claims 4, 13, 14, 18, 27, 28, 32, 41, 42 and 46** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gopal et al (Multicasting to Multiple Groups Over Broadcast Channels, IEEE, July 1994, Pages 2423-2431), hereinafter referred to as Gopal, in view of Tanenbaum (Andrew S. Tanenbaum, "Computer Networks", Pages 190-219, Prentice-Hall, 3rd Edition, 1996).

7. Regarding **claims 4, 18, 32, and 46**, Gopal discloses a method for reliably transmitting a frame comprising the steps of: inserting two or more sequence numbers in the frame, wherein each of the two or more sequence numbers is associated with a destination node; and transmitting the frame to two or more destination nodes. **(See Page 2423, 2nd Column, last two lines and Page 2424, 1st Column, Lines 1-4)**

8. Regarding **claims 13, 14, 27, 28, 41, and 42**, Gopal teaches a method of

retransmitting the frame to the particular destination node of the two or more destination nodes and the frame is a multicast frame. **(See Page 2425, Column 1, Lines 27-35. Gopal's system is all about broadcasting multicast frames and retransmits to more than one destination node)**

Gopal, however, with respect to claims 4,18, 32, and 46, fails to expressly teach a method further comprising the step of saving a copy of the transmitted frame. Gopal, with respect to claims 13, 14, 27, 28, 41, and 42, also fails to expressly disclose a method of receiving a request to retransmit the frame from a particular destination node.

Tanenbaum teaches elementary data link protocols such as ARQ in pages 190-219.

Tanenbaum, with respect to claims 4,18, 32, and 46, discloses a method further comprising the step of saving a copy of the transmitted frame. **(See Page 204 Lines 11-16 and last Paragraph on Page 212.)**

Tanenbaum, with respect to claims 13, 14, 27, 28, 41, and 42, discloses a method of receiving a request to retransmit the frame from a particular destination node. **(See Page 215, last paragraph – NAK messages are resent by the destination nodes)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gopal's method and apparatus to incorporate the use of a buffer to save a copy of the transmitted frame and a method allowing receivers to request retransmission of frames. ***The motivation being to provide reliable data transmission in a transmission medium with a high bit error rate and to achieve***

this goal the transmitter needs to remember all of the packets it has transmitted by saving a copy and the need to detect the errors is addressed by the receivers request for transmission after identifying errors at the receiver. Gopal further indicates that his system is focused on data link protocol that ensures reliable sequential delivery of messages to all destinations and is based on the well known routine Automatic Repeat Request (ARQ) protocol given the fact that it registers Acknowledgments and uses retransmission policy and indicates Go-Back-N and Selective Repeat protocols as an example as stated by Gopal in the last sentence of Column 1, Section 1, 1st paragraph and Column 2, Lines 1-8. Gopal fails to explicitly indicate how the retransmission policy is implemented on Page 2425, Column 1, Lines 27-35 while Tanenbaum discloses that the retransmission policy is implemented using buffers such that a copy of all transmitted frames is saved as stated on pages 204 and 212 and the destination nodes sending NAK message for retransmission request as indicated on the last paragraph of page 215.

9. **Claims 9-11, 23-25, 37-39, and 51-53** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gopal et al (Multicasting to Multiple Groups Over Broadcast Channels, IEEE, July 1994, Pages 2423-2431), hereinafter referred to as Gopal, in view of Gopal et al (Point-to-Multipoint Communication Over Broadcast Links, IEEE, September 1984, Pages 1034-1044), hereinafter referred to as Gopal'84.

Gopal'84 discloses several reliable protocol for point-to-multipoint communications over broadcast channels.

10. Regarding **claims 9, 23, 37 and 51**, Gopal teaches reading a data structure associated with the frame associated with the acknowledgment **(This is inherent to a system such as Gopal's because Gopal's system uses Acknowledgment for every message sent as indicated on Page 2425, 1st Column, Lines 20-27 and 40-50. For every destination the transmitter is in communication with a record is maintained, and the record shows what specific message with what specific sequence number is sent to what destination and such a record by definition is a data structure. Reading the data structure or record to process the received Acknowledgment message is also inherent to the system and the inherency is further supported on Page 2425, 1st Column, Lines 49-51.)**

Gopal teaches all aspects of the claimed invention as set forth in the rejection of claims 5, 19, 33, and 47 but fails to expressly teach a method further comprising the steps of: identifying the particular destination node; identifying a frame associated with the acknowledgment; and indicating in an entry in the data structure associated with the particular destination node that a frame associated with the acknowledgment from the particular destination node has been received.

Gopal'84 discloses a method comprising the steps of: identifying the particular destination node **(See Figure 5, box containing "J- Identity of Receiver Sending Ack". It is inherent to any data transmission system that has a source receiving different packets from different destinations to indicate identity of destination in the header packet and the Ack message will contain identity of destination sending the packet.)**; identifying a frame associated with the acknowledgment **(See**

Figure 5, box containing "L – Sequence of messages being Acknowledged" The basic identity of a frame associated with the acknowledgment is the sequence number which is already stored and matching the Acknowledgment to the stored frame is inherent to a system based on Gopal'84' s teachings which relies on ARQ protocol.); and indicating in an entry in the data structure associated with the particular destination node that a frame associated with the acknowledgment from the particular destination node has been received**(i.e. Gopal'84 indicates in the message data structure the receipt of an acknowledgment from a receiver by removing the receiver from the ack_outstanding list and to one having ordinary skill in the art this limitation that uses destination node data structure is an obvious variation of Gopal'84's disclosure of using message data structure . See Figure 5 and Section 3 on Page 1036).**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gopal's method and apparatus to incorporate the use of ARQ protocol with the ability to identify destination nodes from received acknowledgments and read the data structures of the Ack messages. ***The motivation being to provide reliable data transmission in a transmission medium with a high bit error rate in a multicasting transmission system where the multicast source needs to know where an error occurs amongst the different destination it services and what data it needs to send to the destination experiencing error. Such a goal can be achieved by the multicast source identifying the destination nodes from the acknowledgment message and being able to read a data structure***

indicating what was last sent. Gopal indicates that his system is focused on a data link protocol that ensures reliable sequential delivery of messages to all destinations as stated by Gopal in the last sentence of Column 1, Section 1, 1st paragraph and is based on the well known routine Automatic Repeat Request (ARQ) protocol given the fact that it registers Acknowledgments and uses retransmission policy as stated by Gopal in Section 1, Page 2423, Column 2, Lines 1-8 and on Page 2425 in Lines 45-55. Even though Gopal indicates the use of registered Acknowledgments and retransmission policy he fails to indicate how Ack messages are processed. Gopal'84 in Figure 5 and Section 3 on Page 1036 shows how the data structure of an Ack message is read and the appropriate destination node is identified. The feature of receiving different Acknowledgments from different destinations and further reading the data structure of the Ack message to determine the destination node is inherent to ARQ protocol and ARQ protocol as discussed by Gopal'84 on Page 1034, 2nd Column, Lines 47-52 increases the throughput and operational speed of a network involved in forwarding data sequentially with reliability.

11. Regarding **claims 10, 24, 38, and 52**, Gopal teaches all aspects of the claimed invention as set forth in the rejection of claims 9, 23, 37, and 51 but fails to teach a method further comprising the step of determining if there are outstanding responses for the frame associated with the acknowledgment.

Gopal'84 discloses a method further comprising the step of determining if there are outstanding responses for the frame associated with the acknowledgment. (**See**

Figure 5, element containing "Is ACK_OUTSTANDING List of messages Empty?" and Section 3 on Page 1036)

12. Regarding **claims 11, 25, 39, and 53**, Gopal teaches all aspects of the claimed invention as set forth in the rejection of claims 10, 24, 38, and 52 but fails to teach a method wherein if there are outstanding responses for the frame associated with the acknowledgment then the method further comprises the step of: waiting to receive an additional acknowledgment.

Gopal'84 discloses wherein if there are outstanding responses for the frame associated with the acknowledgment then the method further comprises the step of: waiting to receive an additional acknowledgment. **(See Figure 5 and Section 3 on Page 1036)**

13. With respect to **claims 10,11, 24, 25, 38, 39, 52 and 53**, It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gopal's method and apparatus to incorporate the use of ARQ protocol with a feature to check if there are outstanding responses for the frame associated with the acknowledgment and further waiting to receive an additional acknowledgment. ***The motivation being to provide reliable data transmission sequentially in a transmission medium with a high bit error rate such that the transmitter and receiver will not be out of synch in the exchange of acknowledgment messages.*** Gopal indicates that his system is focused on a data link protocol that ensures reliable sequential delivery of messages to all destinations as stated by Gopal in the last sentence of Column 1, Section 1, 1st paragraph and is based on the well known routine

Automatic Repeat Request (ARQ) protocol given the fact that it registers Acknowledgments and uses retransmission policy as stated by Gopal in Column 2, Lines 1-8 and on Page 2425 in Lines 45-55. Even though Gopal indicates the use of registered Acknowledgments and retransmission policy he fails to expressly disclose the case of what is done if expected registered Acknowledgments are not received. Gopal'84 discusses on how to handle outstanding Acknowledgments in Figure 5. The feature of receiving Acknowledgments and determining outstanding Acknowledgments is inherent to ARQ protocol and ARQ protocol as discussed by Gopal'84 on Page 1034, 2nd Column, Lines 47-52 increases the throughput and operational speed of a network involved in forwarding data sequentially with reliability.

14. **Claims 12, 26, 40, and 54** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gopal et al (Multicasting to Multiple Groups Over Broadcast Channels, IEEE, July 1994, Pages 2423-2431), hereinafter referred to as Gopal, in view of Gopal et al (Point-to-Multipoint Communication Over Broadcast Links, IEEE, September 1984, Pages 1034-1044), hereinafter referred to as Gopal'84 as applied to claims 10, 24, 38, and 52 above, and further in view of Tanenbaum (Andrew S. Tanenbaum, "Computer Networks", Pages 190-219, Prentice-Hall, 3rd Edition, 1996).

The combination of Gopal and Gopal'84 teaches all aspects of the claimed invention as set forth in the rejection of claims 10, 24, 38, and 52 but fails to teach a method wherein if there are no outstanding responses for the frame then the method further comprises the step of releasing memory associated with the frame associated with the acknowledgment.

Tanenbaum teaches a method wherein if there are no outstanding responses for the frame then the method further comprises the step of releasing memory associated with the frame associated with the acknowledgment. **(See Page 204 Lines 11-16 and last Paragraph on Page 212.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gopal's method and apparatus to incorporate the use of a buffer to save a copy of the transmitted frame and release the memory associated with the frame when the frame is acknowledged. ***The motivation being to increases the throughput and operational speed of a network involved in forwarding data sequentially with reliability given the need for the transmitting side to save copy of data packets sent and the limited memory size available for such operation, removing acknowledged data frames and releasing buffer associated with the frames increases traffic on the network.*** Gopal indicates that his system is focused on data link protocol that ensures reliable sequential delivery of messages to all destinations and is based on the well known routine Automatic Repeat Request (ARQ) protocol given the fact that it registers Acknowledgments and uses retransmission policy and indicates Go-Back-N and Selective Repeat protocols as an example as stated by Gopal in the last sentence of Column 1, Section 1, 1st paragraph and Column 2, Lines 1-8. Gopal fails to explicitly indicate how the retransmission policy is implemented on Page 2425, Column 1, Lines 27-35 while Tanenbaum discloses that the retransmission policy is implemented using buffers such that a copy of all transmitted frames is saved

and the occupied buffer space is released after the saved messages are acknowledged as stated on pages 204 and 212.

15. **Claims 6, 7, 20, 21, 34, 35, 48, and 49** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gopal et al (Multicasting to Multiple Groups Over Broadcast Channels, IEEE, July 1994, Pages 2423-2431), hereinafter referred to as Gopal, in view of Gopal et al (Point-to-Multipoint Communication Over Broadcast Links, IEEE, September 1984, Pages 1034-1044), hereinafter referred to as Gopal'84, and Kawan et al (US 5, 572, 572), hereinafter referred to as Kawan.

16. Regarding **claims 6, 20, 34, and 48**, Gopal teaches reading a data structure associated with the frame associated with the acknowledgment **(This is inherent to a system such as Gopal's because Gopal's system uses Acknowledgment for every message sent as indicated on Page 2425, 1st Column, Lines 20-27 and 40-50. For every destination the transmitter is in communication with a record is maintained and the record shows what specific message with what specific sequence number is sent to what destination and such a record by definition is a data structure. Reading the data structure or record to process the received Acknowledgment message is also inherent to the system.)**

Gopal teaches with respect to claims 6, 20, 34, and 48 all aspects of the claimed invention as set forth in the rejection of claims 5, 19, 33, and 47 but fails to expressly teach a method further comprising the steps of: identifying the particular destination node; identifying a frame associated with the acknowledgment; and indicating in an entry in the data structure associated with the particular destination node that a frame

associated with the acknowledgment from the particular destination node has been received.

Gopal'84 discloses a method comprising the steps of: identifying the particular destination node **(See Figure 5, box containing "J- Identity of Receiver Sending Ack". It is inherent to any data transmission system that has a source receiving different packets from different destinations to indicate identity of destination in the header packet and the Ack message will contain identity of destination sending the packet.)**; identifying a frame associated with the acknowledgment **(See Figure 5, box containing "L – Sequence of messages being Acknowledged" The basic identity of a frame associated with the acknowledgment is the sequence number which is already stored and matching the Acknowledgment to the stored frame is inherent to a system based on Gopal'84' s teachings which relies on ARQ protocol.)**; and indicating in an entry in the data structure associated with the particular destination node that a frame associated with the acknowledgment from the particular destination node has been received**(i.e. Gopal'84 indicates in the message data structure the receipt of an acknowledgment from a receiver by removing the receiver from the ack_outstanding list and to one having ordinary skill in the art this limitation that uses destination node data structure is an obvious variation of Gopal'84's disclosure of using message data structure . See Figure 5 and Section 3 on Page 1036).**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gopal's method and apparatus to incorporate the use of

ARQ protocol with the ability to identify destination nodes from received acknowledgments and read the data structures of the Ack messages. ***The motivation being to provide reliable data transmission in a transmission medium with a high bit error rate in a multicasting transmission system where the multicast source needs to know where an error occurs amongst the different destination it services and what data it needs to send to the destination experiencing error. Such a goal can be achieved by the multicast source identifying the destination nodes from the acknowledgment message and being able to read a data structure indicating what was last sent.*** The motivation being Gopal indicates that his system is focused on a data link protocol that ensures reliable sequential delivery of messages to all destinations as stated by Gopal in the last sentence of Column 1, Section 1, 1st paragraph and is based on the well known routine Automatic Repeat Request (ARQ) protocol given the fact that it registers Acknowledgments and uses retransmission policy as stated by Gopal in Section 1, Page 2423, Column 2, Lines 1-8 and on Page 2425 in Lines 45-55. Even though Gopal indicates the use of registered Acknowledgments and retransmission policy he fails to indicate how Ack messages are processed. Gopal'84 in Figure 5 and Section 3 on Page 1036 shows how the data structure of an Ack message is read and the appropriate destination node is identified. The feature of receiving different Acknowledgments from different destinations and further reading the data structure of the Ack message to determine the destination node is inherent to ARQ protocol and ARQ protocol as discussed by Gopal'84 on Page 1034, 2nd Column, Lines

47-52 increases the throughput and operational speed of a network involved in forwarding data sequentially with reliability.

Gopal with respect to claims 6, 20, 34, and 48 further fails to disclose a method of determining if a sequence number associated with the acknowledgment is greater than an expected sequence number.

Kawan discloses an apparatus that is configured both as a telephone and a computer and uses ARQ protocol in communicating to the network.

Kawan teaches a method of determining if a sequence number associated with the acknowledgment is greater than an expected sequence number. **(i.e. Kawan discloses if the transmitting device has stored one or more messages with higher sequence numbers than that of the last received acknowledgment then those messages with greater sequence number are retransmitted. Therefore Kawan teaches sequence number manipulation with the goal of re-transmitting data whenever acknowledgments are not received including cases of "lost Acks" See Column 21, Lines 7-21)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gopal's method and apparatus to incorporate the use of ARQ protocol with the ability to check sequence numbers received are greater than an expected sequence number. ***The motivation being to provide reliable data transmission in a transmission medium with a high bit error rate where the multicast source needs to know where an error occurs amongst the different***

destination it services and what data it needs to send to the destination experiencing error.

17. Regarding **claims 7, 21, 35, and 49**, Gopal teaches all aspects of the claimed invention as set forth in the rejections of claims 5, 19, 33, and 47 but does not disclose a method wherein if the sequence number associated with the acknowledgment is greater than the expected sequence number then the method further comprises the step of detecting a lost acknowledgment.

Kwan teaches a method wherein if the sequence number associated with the acknowledgment is greater than the expected sequence number then the method further comprises the step of detecting a lost acknowledgment. **(Kawan detects lost acknowledgment and accounts the cases when the received sequence number is greater than or less than or equal to the expected sequence number. See Column 21, Lines 7-21)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gopal's method and apparatus to incorporate the use of ARQ protocol with the ability to check sequence numbers received are greater than an expected sequence number. ***The motivation being to provide reliable data transmission in a transmission medium with a high bit error rate where the multicast source needs to know where an error occurs amongst the different destination it services and what data it needs to send to the destination experiencing error.*** Gopal indicates that his system is focused in ensuring reliable sequential delivery of messages to all destinations and is based on the well known

routine Automatic Repeat Request (ARQ) protocol given the fact that it registers Acknowledgments and uses retransmission policy as stated by Gopal in the last sentence of Column 1, Section 1, 1st paragraph and Column 2, Lines 1-8. Gopal fails to explicitly indicate how the retransmission policy is implemented on Page 2425, Column 1, Lines 27-35 while Kawan shows a retransmission policy is implemented by the ability to check sequence numbers received are greater than an expected sequence number as stated in Kawan's Column 21, Lines 7-21. The step of using ACK message for indicating either retransmission or success in transmission increases the reliability of a network involved in forwarding different types of data including multicast frames by guaranteeing error free in sequence delivery of frames.

18. **Claims 8, 22, 36 and 50** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gopal et al (Multicasting to Multiple Groups Over Broadcast Channels, IEEE, July 1994, Pages 2423-2431), hereinafter referred to as Gopal, in view of Gopal et al (Point-to-Multipoint Communication Over Broadcast Links, IEEE, September 1984, Pages 1034-1044), hereinafter referred to as Gopal'84, and Bennett et al (US 2005/0021832), hereinafter referred to as Bennett.

Gopal teaches reading a data structure associated with the frame associated with the acknowledgment **(This is inherent to a system such as Gopal's because Gopal's system uses Acknowledgment for every message sent as indicated on Page 2425, 1st Column, Lines 20-27 and 40-50. For every destination the transmitter is in communication with a record is maintained and the record shows what specific message with what specific sequence number is sent to what**

destination and such a record by definition is a data structure. Reading the data structure or record to process the received Acknowledgment message is also inherent to the system.)

Gopal teaches all aspects of the claimed invention as set forth in the rejection of claims 5, 19, 33, and 47 but fails to expressly teach a method further comprising the steps of: identifying the particular destination node; identifying a frame associated with the acknowledgment; and indicating in an entry in the data structure associated with the particular destination node that a frame associated with the acknowledgment from the particular destination node has been received.

Gopal'84 discloses a method comprising the steps of: identifying the particular destination node **(See Figure 5, box containing "J- Identity of Receiver Sending Ack". It is inherent to any data transmission system that has a source receiving different packets from different destinations to indicate identity of destination in the header packet and the Ack message will contain identity of destination sending the packet.)**; identifying a frame associated with the acknowledgment **(See Figure 5, box containing "L – Sequence of messages being Acknowledged" The basic identity of a frame associated with the acknowledgment is the sequence number which is already stored and matching the Acknowledgment to the stored frame is inherent to a system based on Gopal'84' s teachings which relies on ARQ protocol.)**; and indicating in an entry in the data structure associated with the particular destination node that a frame associated with the acknowledgment from the particular destination node has been received**(i.e. Gopal'84 indicates in the message**

data structure the receipt of an acknowledgment from a receiver by removing the receiver from the ack_outstanding list and to one having ordinary skill in the art this limitation that uses destination node data structure is an obvious variation of Gopal'84's disclosure of using message data structure . See Figure 5 and Section 3 on Page 1036).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gopal's method and apparatus to incorporate the use of ARQ protocol with the ability to identify destination nodes from received acknowledgments and read the data structures of the Ack messages. ***The motivation being to provide reliable data transmission in a transmission medium with a high bit error rate in a multicasting transmission system where the multicast source needs to know where an error occurs amongst the different destination it services and what data it needs to send to the destination experiencing error. Such a goal can be achieved by the multicast source identifying the destination nodes from the acknowledgment message and being able to read a data structure indicating what was last sent.*** Gopal indicates that his system is focused on a data link protocol that ensures reliable sequential delivery of messages to all destinations as stated by Gopal in the last sentence of Column 1, Section 1, 1st paragraph and is based on the well known routine Automatic Repeat Request (ARQ) protocol given the fact that it registers Acknowledgments and uses retransmission policy as stated by Gopal in Section 1, Page 2423, Column 2, Lines 1-8 and on Page 2425 in Lines 45-55. Even though Gopal indicates the use of registered Acknowledgments and retransmission

policy he fails to indicate how Ack messages are processed. Gopal'84 in Figure 5 and Section 3 on Page 1036 show how the data structure of an Ack message is read and the appropriate destination node is identified. The feature of receiving different Acknowledgments from different destinations and further reading the data structure of the Ack message to determine the destination node is inherent to ARQ protocol and ARQ protocol as discussed by Gopal'84 on Page 1034, 2nd Column, Lines 47-52 increases the throughput and operational speed of a network involved in forwarding data sequentially with reliability.

Gopal further fails to disclose a method of identifying a previous entry associated with a frame transmitted with an implicit acknowledgment as having been received.

Bennett teaches deferred acknowledgment communications and alarm management.

Bennett discloses a method of identifying a previous entry associated with a frame transmitted with an implicit acknowledgment as having been received. **(See Paragraphs 10, 47, and 69 and also Figure 5.)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify of Gopal's method to incorporate the use of identifying a previous entry associated with a frame transmitted with an implicit acknowledgment as having been received, the motivation being increasing the throughput by minimizing the idle time of the communication link in decreasing the amount of acknowledgment messages sent over the link as indicated in the last line of Bennett's Paragraph 8.

19. **Claims 2, 16, 30, and 44** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gopal et al (Multicasting to Multiple Groups Over Broadcast Channels, IEEE, July 1994, Pages 2423-2431), hereinafter referred to as Gopal, in view of Tanenbaum (Andrew S. Tanenbaum, "Computer Networks", Pages 190-219, Prentice-Hall, 3rd Edition, 1996), as applied to claims 4, 18, 32, and 46 above and further in view of Kalkunte et al (US Pub. No. 2003/0118016), hereinafter referred to as Kalkunte.

The combination of Gopal and Tanenbaum teaches all aspects of the claimed invention as set forth in the rejection of claims 4, 18, 32, and 46 but fails to teach a method further comprising the step of inserting one or more bits in a frame header of the frame to select appropriate ports in a switch fabric to transmit the frame.

Kalkunte discloses a method of forwarding data to a specific port in a network switch.

Kalkunte discloses a method inserting one or more bits in a frame header of the frame to select appropriate ports in a switch fabric to transmit the frame. **(See Paragraphs 11 and 42-46)**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gopal's method and apparatus to incorporate the use of bits in a header frame to specify a switch port. ***The motivation of using bits in a header frame to specify a switch port provides self-routing capability and contributes to increasing the throughput and operational speed of a network involved in forwarding different types of data including multicast frames.***

Gopal's system is focused in increasing throughput by only sending transmission to specific destinations as indicated in Column 1, Lines 19-27. Gopal does not clearly indicate how specific destinations are selected and how the method of indicating a specific destination in a header increases throughput. Kalkunte in Paragraphs 9, 10, and 11 indicate use of bits in a header frame to indicate a particular switch port provides self-routing capability and contributes to increasing the throughput and operational speed of a network involved in forwarding different types of data including multicast frames.

20. **Claims 3, 17, 31 and 45** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gopal in view of Tanenbaum and Kalkunte, as applied to claims 2, 16, 30, and 44 above, and further in view of Bennett et al (US 2005/0021832), hereinafter referred to as Bennett.

The combination of Gopal, Tanenbaum, and Kalkunte teaches all aspects of the claimed invention as set forth in the rejections of claims 2, 16, 30, and 44 but does not disclose a method of setting a bit in a frame header to indicate an explicit or implicit acknowledgment.

Bennett discloses a method where efficient transmission of data through a low bandwidth link is realized using deferred acknowledgment messages.

Bennett teaches a method further comprising the step of setting a bit in the frame header of the frame to indicate an explicit or an implicit acknowledgment. **(See Paragraphs 10, 47, and 69 and also Figure 5. Bennett like the Applicant, as indicated in the Specification on Page 16, Lines 11-14 and Page19, Lines 3-5,**

refers to implicit acknowledgment to simply not requiring the destination node that received the transmitted frame to transmit a response acknowledging the delivery of the frame.)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combination of Gopal's, Tanenbaum's and Kalkunte's method to incorporate the use of bits in a header frame to specify whether explicit or implicit acknowledgment is required, the motivation being increasing the throughput by minimizing the idle time of the communication link in decreasing the amount of acknowledgment messages sent over the link as indicated in the last line of Gopal's Paragraph 8. Gopal's system is also focused in minimizing the idle time of the communication channel by only communicating with active destinations as indicated on page 2425, 1st column, in lines 42-47.

Response to Arguments

21. Applicant's arguments filed 4/4/2006 have been fully considered but they are not persuasive.

22. Examiner has withdrawn the 112, 2nd paragraph, rejections of claims 4, 5, 18, 19, 32, 33, 46, and 47 in view of the explanation provided by the Applicant.

23. In the Remarks, in Section II, on page 5, Applicant argues that the 102(b) rejection of claims 5, 19, 13, and 47 is incorrect. Applicant further argues that Gopal fails to indicate all limitations of the claims. In particular, Applicant argues, Gopal fails to disclose the claimed limitation that the source receives acknowledgment from a particular destination node of which the node is one of the many nodes the source has

previously engaged in transmitting packets. Further Applicant argues that Gopal does not teach any use of ARQ methods and ARQ does not necessarily imply acknowledgments will be received.

Examiner respectfully disagrees with the Applicant's conclusions. First, the Examiner would like to point out that in the Remarks on page 5 that the Applicant clearly states, "Gopal discloses works that considered alternatives for registering the acknowledgments at the source". There is no question, in the Examiner's opinion, that the Applicant's statement quoted above which is based on the teachings of Gopal clearly indicates that the source involved in multicasting in Gopal's system was getting acknowledgments from the many destinations that are recipient of the multicast transmission. Moreover, Gopal teaches receiving acknowledgments on Page 2425, Column 1, Lines 27-35 and clearly due to errors only few acknowledgments will be received and hence the claimed limitation is adequately addressed by Gopal.

Furthermore, Gopal mentions different kinds of retransmission policy including go-back-N and selective repeat on the 2nd Column, in line 6. Even based on the Applicant's definition of ARQ provided on page 6 of the Remarks it is clear that ARQ schemes was being used by Gopal. Finally, Tanenbaum on page 200 (the reference was provided to the Applicant as part of the last Office Action) clearly defines ARQ protocol as a protocol in which the sender waits for positive acknowledgment before advancing to the next data item. Therefore, there are compelling grounds to maintain the 102B rejection to claims 5, 19, 13, and 47.

24. In the Remarks, Section III, Part A, item 1, on page 7 Applicant argues Gopal fails to teach retransmitting a frame to a particular destination node of the two or more destination nodes as claimed at least in claim 13. Examiner respectfully disagrees with Applicant's conclusion.

Gopal on page 2525, column 1, lines 27-35 clearly teaches the claimed limitation which is retransmitting a frame to a particular destination node of the two or more destination nodes. Gopal teaches in this section that its multicast source has the ability to transmit to any subset of the larger destination set. Gopal also teaches each receiver continuously sends acknowledgments and therefore to one ordinarily skilled in the art it is very obvious that Gopal teachings address the claimed limitation.

25. In the Remarks, Section III, Part B, item 1, on page 16, and Part D, item 1 on pages 26-27, Applicant while acknowledging that Gopal teaches that acknowledgments are sent for every message upon its acceptance as well as for the most recently accepted message, also argues that the limitation claimed at least in claim 9 that states, "...reading a data structure associated with the frame associated with the acknowledgment." is not taught by Gopal and the reason provided for inherency is not adequate.

Examiner respectfully disagrees with Applicant. Adequate reasons for inherency are provided in the rejection of claim 9. Further it is shown in Gopal on page 2425, in Lines 49-51 that when simply a message is acknowledged the history of the recipients of that message is deleted. One can easily say the history of the recipients is a data structure and the data structure has to be read in order to be manipulated for deletion.

26. In the Remarks, Section III, Part C, item 1 on page 23, Applicant argues that the limitation in claim 12 that states releasing a memory associated with a frame when the matching acknowledgment arrives is not taught by Tanenbaum. Applicant argues Tanenbaum does not use the exact phrase as claimed in claim 12, which is releasing memory associated with a frame.

Examiner respectfully disagrees. Tanenbaum clearly teaches the limitation on page 212 by indicating buffers are released when acknowledgment packets are received. Releasing a buffer is the same as releasing memory.

27. In the Remarks, Section III, Part D, item 2, on page 28, Applicant argues that the claimed limitation of claim 6 that specifically states determining if a sequence number associated with the acknowledgment is greater than an expected sequence number is not taught by Kawan.

Examiner respectfully disagrees with Applicant's conclusion. Kawan teaches the claimed limitation as stated in Column 21, Lines 7-21. Clearly Kawan does sequence number comparisons and compares it with the sequence numbers of the frames stored and of course the highest sequence of the stored frames is the expected sequence number.

28. In the Remarks, Section III, Part E, item 1, on page 37, Applicant argues that Bennett does not teach the claimed limitation of identifying a previous entry associated with a frame transmitted with an implicit acknowledgment.

Examiner respectfully disagrees with Applicant's conclusion. Bennett does indeed teaches the claimed limitation of identifying a previous entry associated with a

frame transmitted with an implicit acknowledgment at least based on the discussion provided in paragraphs 10 and 69. Bennett teaches each acknowledgment typically operates to acknowledge a plurality of messages in a message bundle and serves as the implicit acknowledgment for the message bundle. He further teaches the transmitting station requests an acknowledgment for at least one message (e.g. the last message sent) within the bundle. Therefore the remaining messages in the bundle constitute the previous entries and the acknowledgment for the last message serves as an implicit acknowledgment.

29. The Examiner has updated all of the motivations in every 103 rejections to clearly indicate the benefits to a skilled artisan. It is the position of the Examiner that the motivations provided in this Office Action do meet MPEP guidelines.

30. In conclusion, it is the Examiner position that Gopal adequately teaches the key element of the Applicant's invention, which is assigning unique sequence space for each destination in every multicast frame transmitted by the source to all destinations. The other references cited adequately teach all of the well-known ARQ protocol features claimed in the application.

Conclusion

31. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following US Patent Application Publication and US Patent are cited to show the state of the art with respect to Limited ARQ and buffer management in ARQ Protocol:

US Pub. No. (2002/0034182) to Mallory

US (4654654) to Buttler et al

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Habte Mered whose telephone number is 571 272 6046. The examiner can normally be reached on Monday to Friday 9:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on 571 272 3088. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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HM
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